ployed in the laboratories, in the collecting and preserving departments, aquarium and elsewhere.

This seems at the first thought a very large staff, but the activities of the institution are most varied and far-reaching, and everything that is undertaken is carried to a high standard of perfection. Whether it be in the exposition of living animals to the public in the wonderful tanks of the "Acquario," in the collection and preparation of choice specimens for Museums, in the supply of laboratory material and mounted microscopic objects to Universities, in the facilities afforded for research, or in the educational influence and inspiration which all young workers in the laboratory feel—in each and all of these directions the Naples station has a world-wide renown. And the best proof of this reputation for excellence is seen in the long list of biologists from all civilised countries who year after year obtain material from the station or enrol as workers in the laboratory. Close on 1200 naturalists have now since the opening of the Zoological Station in 1873 occupied work-tables, and as these men have come from and gone back to practically all the important laboratories of Europe and America, from St. Petersburg to Madrid, and from California to Japan, Naples may fairly claim to have been for the last quarter of a century a great international meeting-ground of biologists, and to have exercised a stimulating and co-ordinating influence upon biological research which it would be difficult to over-estimate.

The opportunities for taking part in collecting expeditions at sea are most valuable to the young naturalist. Dredging, plankton-collection and fishing are carried on daily in the Bay of Naples by means of the two little steamers belonging to the station, and a flotilla of fishing and other smaller boats. Many of the Neapolitan fishermen are more or less in the employ of the station, or bring in such specimens as they find in their work. The collecting organisation, under the charge of Dr. Lo Bianco, is now sufficient to provide from fifty to sixty workers at a time with all the material requisite for their varied researches.

But although the work of the Naples Zoological Station is thus many-sided, the leading idea is certainly original research. An investigator goes to Naples to make some particular discovery, and he goes there because he knows he will find material, facilities and environment such as exist nowhere else in the same favourable combination. The British Association Committee consider it most important that these opportunities for research should be open to British biologists in the future as they have been in the past, and it is on this ground that they confidently recommend the policy of sending selected investigators to Naples each year—a practice which has led to such satisfactory results in the past, and is full of promise for the future.

W. A. HERDMAN.

THE BRADFORD MUNICIPAL TECHNICAL COLLEGE.

DURING the recent Bradford meeting of the British Association many members availed themselves of the opportunity of inspecting the splendid Technical College which commenced a new era under the auspices of the Municipal Council twelve months ago. A description of the organisation of the college, and the work of its various departments, is given in the current number of *The Record of Technical and Secondary Education*, from which source, and the *Bradford Observer*, the following particulars have been derived. We are indebted to the Editor of the *Record* and to Mr. J. Nutter, secretary of the school, for the accompanying illustrations.

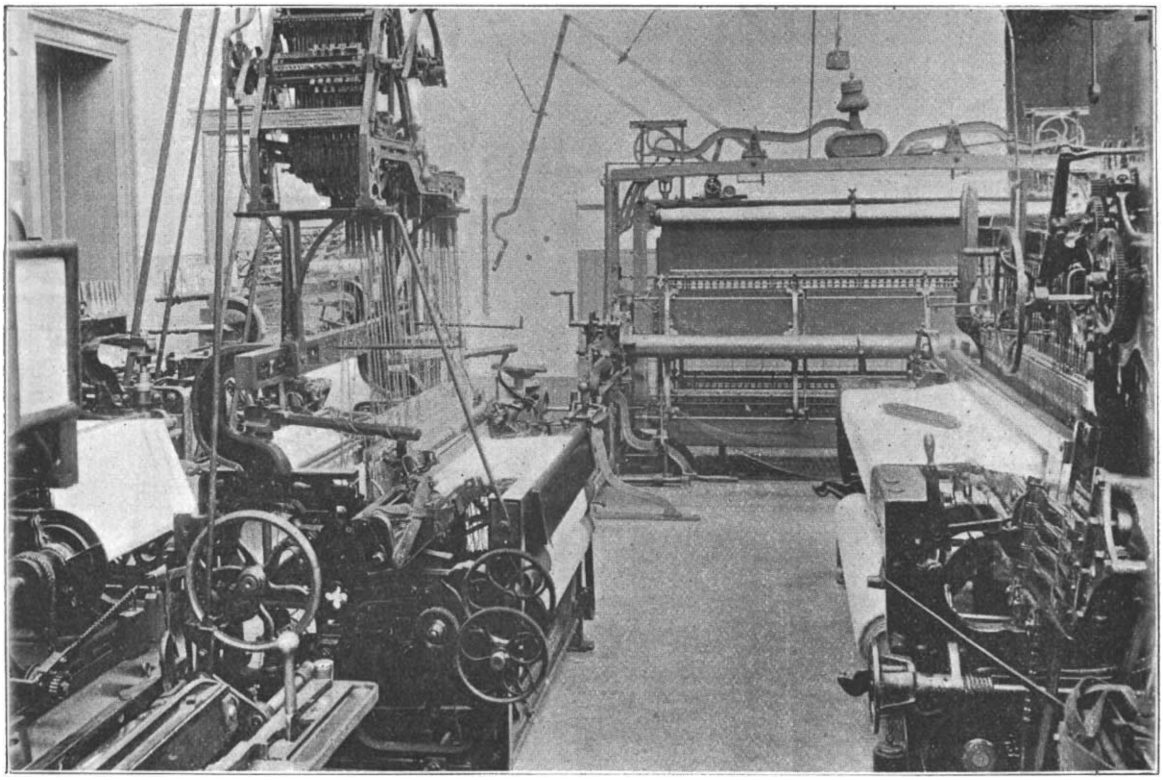

FIG. 1—Department of Textile Industries, Bradford Municipal Technical College—power loom shed, showing dress goods and coating looms and embroidery frame.

The management of the college is now in the hands of the Technical Instruction Committee of the Bradford City Council, and the scheme defining the objects of the college is as follows:—"The general object of the foundation shall be the maintenance of a technical college under the Technical Instruction Acts for persons above 14 years of age, subject to the provision that no secondary day school or school of science shall be carried on in the college, but that day and evening classes may be held in the subjects of art, and of manual, scientific or technical instruction connected with the trades and manufactures of Bradford and the neighbourhood, to which none shall be admitted under the age of 15 years, except on the recommendation of the governing body of the school in which they have been taught, and in no case under the age of 14 years; in advanced commercial subjects at day and evening classes, to which none shall be admitted under the age of 16 years."

Department of Textile Industries.

In the textile industries department, which is directed by Mr. A. F. Barker, the idea that a satisfactory knowledge of the subject can be gained at evening classes has been given up as fallacious. A three years' course of study for day students has been mapped out, and students who enter must take at least two years of the course, though it is preferable that the whole should be gone through. In addition, a one-year course of textile-mechanics has been arranged, and a special textile and dyeing course is also available for those who desire to carry their studies still further. Such evening classes as have been arranged are all specialised courses for the benefit of those who, having passed through the day classes, are now engaged in the textile trade. In the day classes the teaching of the subject is subservient to the training of the student: in the evening classes means are afforded the already well-grounded student for gaining all possible up-to-date knowledge of his particular branch of the trade. One item in the arrangements deserves special mention, as it is an anticipation of the great development which will eventually take place. Lectures on the preparation of wool and its treatment until it reaches the yarn stage are included in the three years' day course, and for the evenings a course of twenty-five lectures by acknowledged experts in the various branches has been arranged. This is in preparation for the carrying out of the full plan of the committee to remodel the textile industries department by providing plant for the practical teaching of the whole of the operations involved in the production of cloth from the raw material. The Clothworkers' Company have recently carried out a similar scheme at the Yorkshire College. The idea, which as far as possible will be worked to, in providing new buildings and machinery, is to make the college a model factory in which, subject to obvious limitations, work will be carried out on an economical and commercial scale. In the "model factory" each department would balance the other. For instance, there would be a sufficiency of spinning frames to supply the necessary yarn to the looms, and so on throughout. Many important advantages would follow such a scheme. It would add interest to the work, and the students, in addition to gaining skill in the various operations and knowledge of the scientific laws which govern them, would also get an insight into mill management, a practical acquaintance with manufacturers' book-keeping, and a grasp of the economic problems involved.

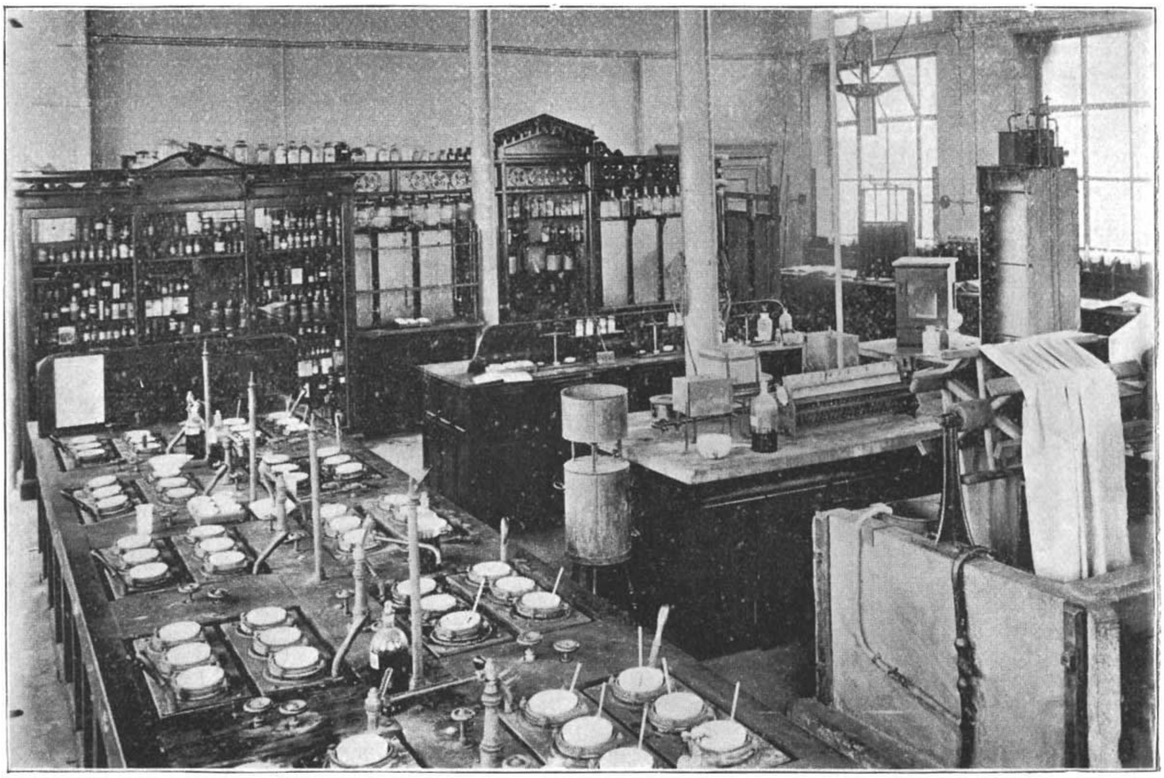

FIG. 2.—Dyehouse of the Department of Chemistry and Dyeing, Bradford Municipal Technical College.

Department of Chemistry and Dyeing.

Mr. W. M. Gardner is in charge of this department. In addition to the work in the chemical laboratories and experimental dyehouse, it is intended that in the future a practical dyehouse, fitted with typical machinery—including finishing machines—shall be provided, in which the students may be introduced to practical work. An experimental dyehouse for trade research work will also be an important feature in the future. The complete course in chemistry and dyeing occupies three years. The first year's work consists largely of chemistry and physics; the second includes chemistry, but dyeing is specially studied; and in the third year the work is to be still more specialised, and the students will be engaged during a part of their time in the dyeworks of the city. The course is made as complete as possible by the inclusion of physics (with special reference to chemical questions and to colour) and engineering (with special reference to dyeworks machinery). The work of this department in the future, and especially when the new buildings are available, will cover a much wider field than the dyeing trade, and will deal with all the chemical industries of the neighbourhood, but the same principle will operate, and every new branch that is opened and every fresh class that is started will have a direct bearing upon some local industry. Some of the new lines of work are supplementary to the other departments. Thus, teaching in bacteriology forms part of the civil and sanitary engineering classes, and metallurgy—for which a laboratory is to be built and a lecturer appointed—will be taken by mechanical engineering students. Botany, biology and microscopy are sciences which have a direct bearing on many of Bradford's industries, and they have also been taken up. The evening classes consist of specialised courses in chemistry and dyeing for advanced students and persons already engaged in trade.

Engineering Department.

The work of the engineering department, which is under Mr. G. F. Charnock, is divided into four sections, viz. (1) civil engineering, (2) mechanical engineering, (3) electrical engineering, and (4) building trades and architecture, the last named being in conjunction with the art department. Some much-needed additions to the machinery are to be made. Several new machine tools have been ordered, and, as opportunity offers, it is intended to substitute the newest examples for all machines of an old-fashioned type. The new syllabus in civil engineering has been framed to meet the requirements of the various professional bodies. A special feature is to be made of sanitary work, and some attention, including laboratory work, will be given to the new methods of sewage treatment. The mechanical engineering department has an increasingly important part to play in the industrial life of Bradford, and by no means the least important part of the work of this department will be to assist in training up a class of men suitable for the position of power superintendent in mills and factories. In the development of new ideas the department has also its place. The systematic study of mechanism and the method of designing mechanical motions would enable many a good idea which would otherwise be lost to its inventor to be worked out to a successful issue Almost every technical school of any note on the Continent and in America has its collection of models systematically arranged to lead up from the simplest motions to the most complicated contrivances, but Bradford as yet can give the inventor no such aid.

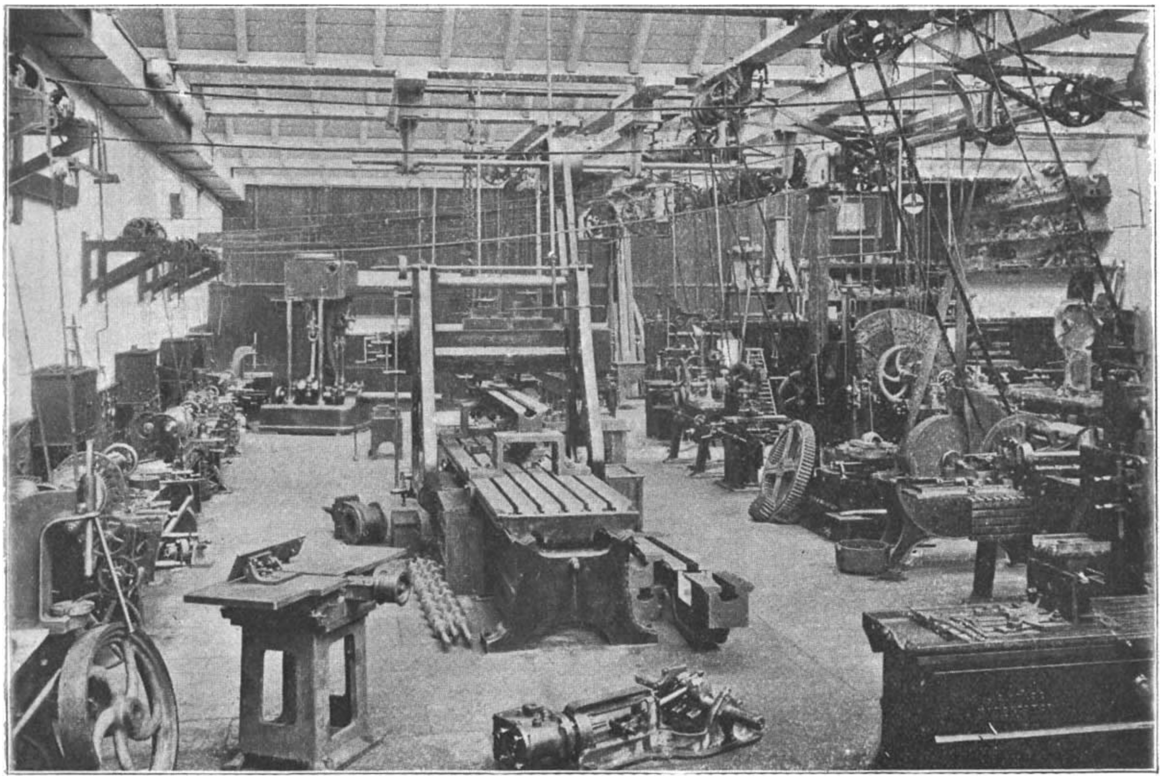

FIG. 3.—Workshop of the Department of Civil and Mechanical Engineering, Bradford Municipal Technical College.

Arrangements have been made for the proper teaching of electrical engineering, and a laboratory has been fitted up for practical work.

A room has also been reserved as a mathematical laboratory, and is fitted with apparatus and models to render the teaching as concrete as possible. Special attention is given to the slide rule, and there is a useful collection of measuring instruments. A calculating machine and other similar apparatus have also been provided.

A SUSPENDED RAILWAY.

THE curious railway represented in the accompanying illustration from *La Nature* runs from Vohwinkel to Barmen, through Elberfeld, along the Wupper Valley, in Rhenish Prussia. It is now working regularly, and was to have been formally opened recently by the Emperor of Germany, but the ceremony was postponed on account of the illness of the Empress Frederick. Brief descriptions of the railway have been given in several periodicals, and an illustrated account appears in the October number of the *English Illustrated Magazine*, from which some of the following particulars have been derived.

The total length of the railway is about 8¼ miles, of which more than three-quarters is over the river Wupper. The railway is supported above the river on A-shaped trestles, with the sides rising from each bank, and are placed at intervals of 30 metres. In the highway, along the roads, the supports take the form of an inverted U. The lower part of the latticed girders at the top of the supports contains the rail from which the carriages are suspended. Upon the upper face of this rail runs a two-wheeled truck or trolley containing the electric motors. Two of these trucks, placed nearly thirty feet apart, are supplied to each carriage. From each truck a heavy hook, fastened to the roof of the carriage, projects round the rail, as